

TACIR

The Tennessee Advisory Commission
on Intergovernmental Relations



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MEMORANDUM

TO: TACIR Commission Members

FROM: Harry A. Green *Harry*
Executive Director

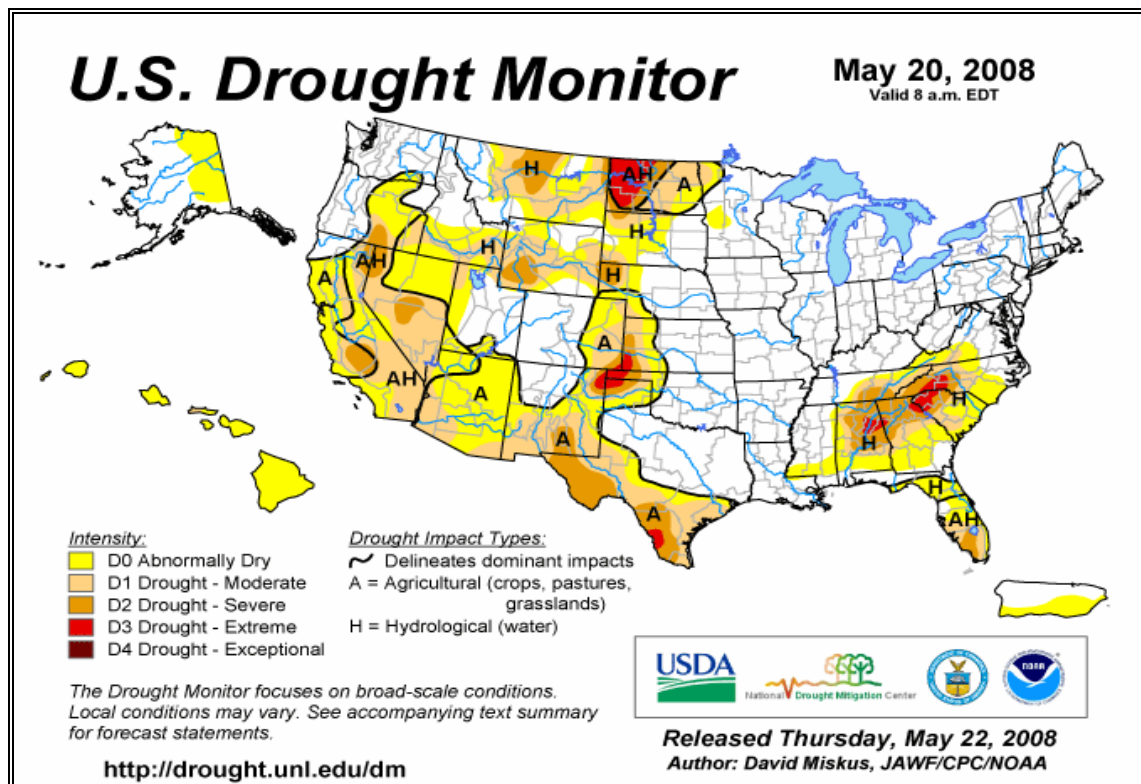
DATE: June 12, 2008

SUBJECT: Water Supply Needs and Issues in Tennessee

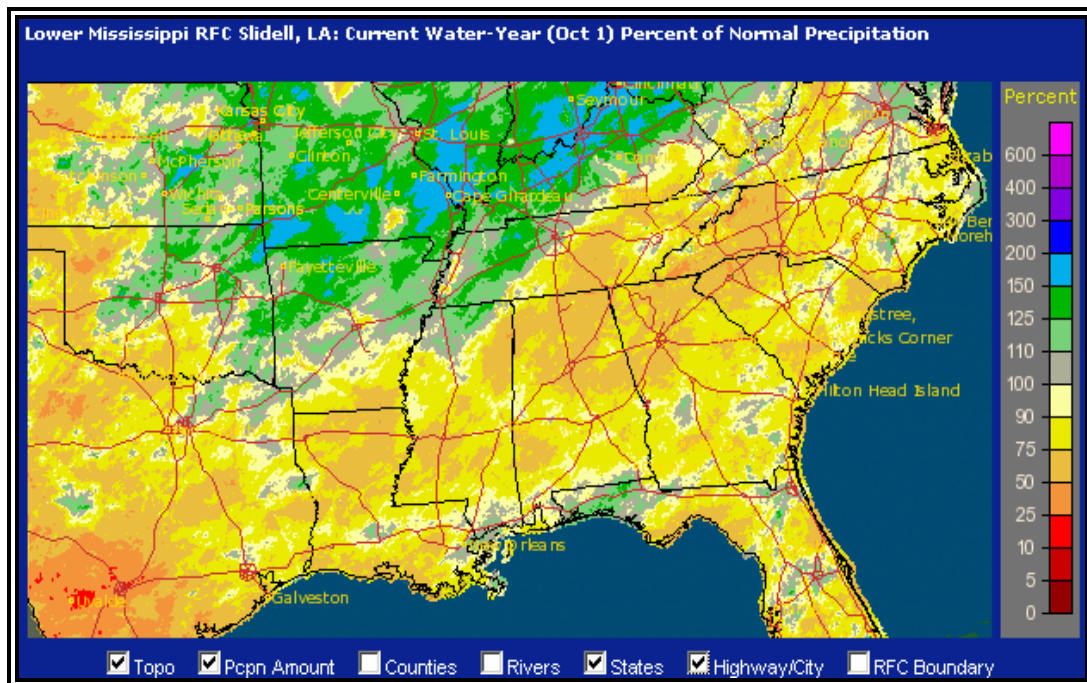
Throughout 2007, Tennessee along with much of the southeastern portion of the nation witnessed one of the worst droughts affecting the region in more than 100 years caused by prolonged periods of unusually hot and dry weather conditions. While periods of drought have occurred in Tennessee in the past, conditions in 2007 were particularly acute approaching record levels in many areas of the state. Newspaper reports across the state reported almost daily on the widespread effects that this prolonged period of hot and dry weather has had on the state's water supplies and the people who rely on them.

Unfortunately, these drought conditions have continued to persist into 2008 in many parts of the state, raising concerns among water supply managers and water utility operators about the availability of water in the year ahead. The arrival of the typically wet winter season has brought some relief from the extreme dry conditions of last summer, and western portion of the state has seen a surplus of rainfall. However despite what may seem like ample rainfall, much of the state remains in a rain fall deficit. The National Drought Mitigation Center at the University of Nebraska continues to rate large portions of the central and eastern parts of Tennessee as ranging from dry to severely dry, with the dries areas in the southeastern part of the state. The National Drought Preparedness Center also indicates that much of the central and eastern portions of Tennessee have received as little as 50% of the normally anticipated amount of rainfall for the current weather year dating back to October 1, 2007. Thus, we have a situation in which we are approaching what is normally the driest time of year behind in the average annual rainfall total for the year, during a year when we continue to have lingering water deficits from the previous year. (For more understanding of drought concepts and effects, see Attachment A.)

Recent Measure of Drought Conditions in US



Percent of Normal Precipitation all for Climatic Year Beginning Oct 1, 2007



Source: National Drought Preparedness Center.

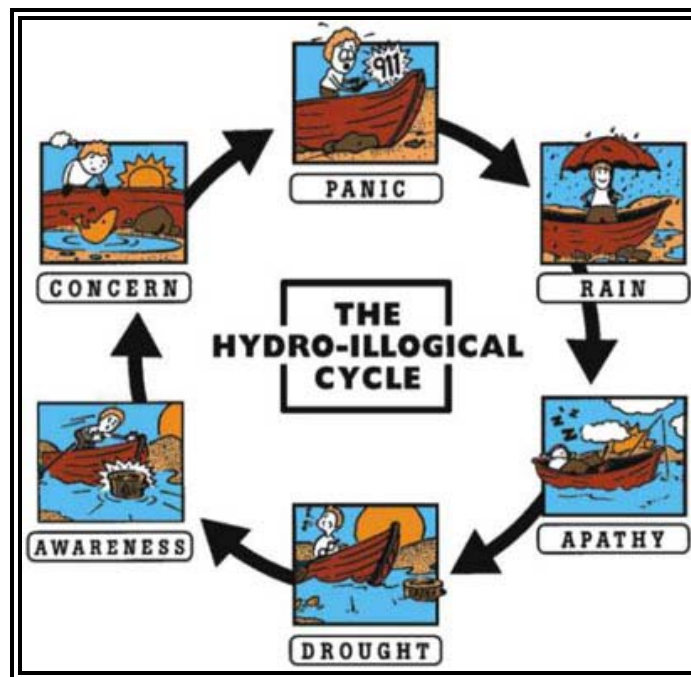
Even in areas where rainfall amounts are returning to normal levels, many reservoirs and wells are predicted to remain low because of the lingering effects of last year's extreme rainfall deficits. We do not know whether this recent drought is part of an ordinary, periodic dry spell that can be expected from time to time, or part of a longer term shift in climatologic patterns that would require us to begin to rethink our expectations about rainfall and how we manage our water resources.

Understanding and Planning for Water Shortages and Drought

At its most basic level, drought conditions are usually thought of as a shortage of water caused by below normal rainfall over an extended period. For drought conditions to develop, rainfall deficits usually have to last for more than a single rainfall season. In fact, when droughts do develop, they tend to last for three seasons or more. In regions like Tennessee where rainfall is normally concentrated in the winter and spring months, significant precipitation shortages during those seasons tend to have long lasting effects as stored water is drawn on during the summer and fall. Water that typically would be stored during the wet months is not available for use during the drier times of year.

"We welcome the first clear day after a rainy spell. Rainless days continue for a time and we are pleased to have a long spell of such fine weather. It keeps on and we are a little worried. A few days more and we are really in trouble. The first rainless day in a spell of fine weather contributes as much to the drought as the last, but no one knows how serious it will be until the last dry day is gone and the rains have come again." (I.R. Tannehill, Drought: Its Causes and Effects, Princeton University Press, Princeton, New Jersey, 1947.)

The Hydro-Illogical Cycle



Source: Nation Drought Mitigation Center, University of Nebraska-Lincoln

Unlike other natural disasters, drought does not have a clearly defined beginning and end. As a result, our reaction to drought traditionally has not been timely. Although droughts often end without long severe lasting consequences, sometimes they serve as a warning about weaknesses or vulnerabilities within local water supply systems. In some cases, the effects of the drought may have been less severe with changes in water management practices. The hydro-illogical cycle, however, illustrates how easy it is for us as humans to sidestep making important preparations for dealing with these systemic weaknesses once the immediate dangers have passed.

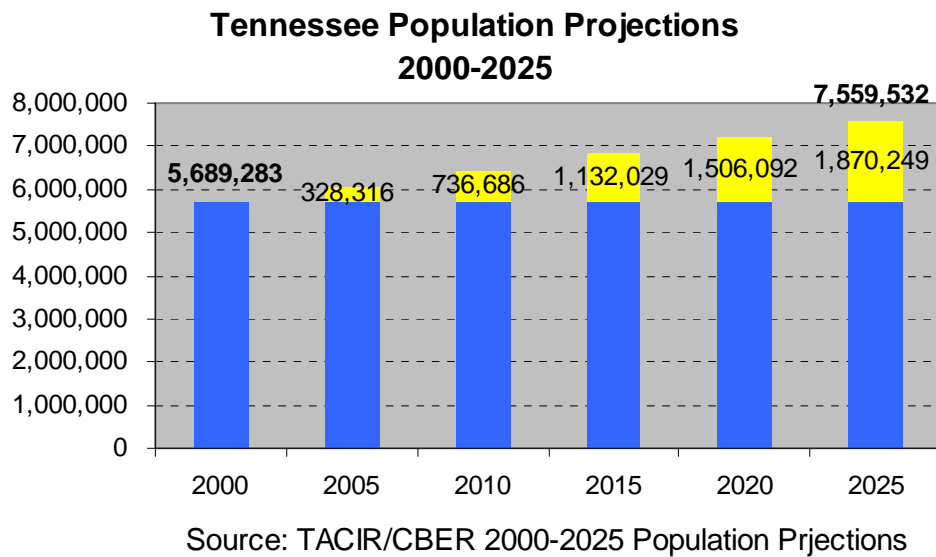
Growing Water Needs

The recent drought raised important questions about the state's ability to provide adequate water to meet the needs of its people and businesses in a consistently reliable fashion, and it has implications for how the state and local governments might be able to manage future growth and development. Tennessee and many parts of the southeastern region of the country have been home to some of the more resilient sectors of the nation's economy in recent years. Demands on the state's water supply will only increase as the state's population and economy continue to expand. Tennessee's population continues to grow, a trend that is expected to extend into the foreseeable future. The 2000 Census revealed that Tennessee's population was 5.7 million people. By the year 2025, the population of the state is expected to grow by almost 2 million to 7.6 million, an increase of 33%. The water needs of an expanding population must also be balanced against the needs of agriculture, maintaining an acceptable level of water quality in our streams and lakes, along with the demands of hydroelectric power generation, navigation, and recreational uses.

In addition to concerns about the overall amount of water available potentially available, some portions of the state are more vulnerable than others and many long standing problems of inadequate water delivery infrastructure or face serious challenges to establishing and maintaining a reliable water delivery system for their communities. While Tennessee as a whole may be considered to have an abundance of water resources, these water supplies are not evenly distributed and available for consumer use across the state. Some communities in the more rapidly growing portions of the state have water supply challenges because of the capacity of their local rivers. These issues have been reported along the Duck and Harpeth Rivers where water flows are currently strained but the demand for water from these streams remains high.

This is the case in many of the state's rural areas, especially those not located near a major river and dependant either on water flows in one of the minor streams or on limited ground water sources. For example, there are many portions of the Cumberland Plateau that are simultaneously experiencing growing populations and limited locally available water supplies. The potential costs of supplying drinking water in rural areas where populations are highly scattered is also a major concern. A survey of rural water supply needs by TDEC in 2005 estimated that Statewide, there are well over 110,000 homes without public water service. It is further estimated that more than 18,000 miles of water lines and approximately \$1.7 billion would be needed to extend public water service to all Tennessee households. The state's annual infrastructure needs survey has recently included reports of approximately \$1.6 billion of identified water supply

needs and an additional \$1.7 billion is combined water and waste water categorized projects. Funding the projected water supply needs across the state is thus likely to be a costly endeavor.



An additional issue that many in Tennessee are also aware of is the large and growing water needs of urban regions outside but bordering Tennessee, particularly the Atlanta, Georgia region. The recent drought in Tennessee has also been acutely felt across large portions of Georgia and has severely reduced the water sources of the greater Atlanta region, principally Lake Lanier and the Chattahoochee River. Many policy makers in Georgia are looking increasingly to the water flows of the Tennessee River system to address their own pressing water needs. Some lawmakers in Georgia have even revived an historical dispute over the correct placement of the Tennessee/Georgia boarder that might give Georgia riparian access to some of the waters in the Tennessee River.

Water Management in Tennessee

The ongoing management and allocation of water resources in Tennessee is divided among a wide array of governmental entities and private providers rather than by any single entity. Under Tennessee state law, all surface and ground waters in Tennessee are considered to be the property of the state and held in public trust for the use of the people of the state (TCA 69-3-102a). But how those waters come to be divided up and allocated to various and sometimes competing users involves a number of different players. The divided nature of water supply management practices in Tennessee can present challenges in making decisions about the allocation of water and coordinating responsibilities. In Tennessee, this is spread across an array of state and federal agencies, each having different roles and responsibilities. These agencies have divided responsibilities spanning a range of programmatic areas, and are made up of units of both the state and federal government. At the local level, responsibilities are spread

across public water utilities, water companies, and municipal water systems. These agencies include

- the Tennessee Department of Environment and Conservation (TDEC),
- the Tennessee Valley Authority (TVA),
- the U.S. Army Corps of Engineers (USACE),
- municipal water utilities,
- public utility districts, and
- private water companies.

While these agencies are the key players in the water distribution decision-making process for these river systems, they do not act alone. Their decisions are also tempered by input from a collection of citizen groups, environmental stewards, and other government agencies. Some of these include

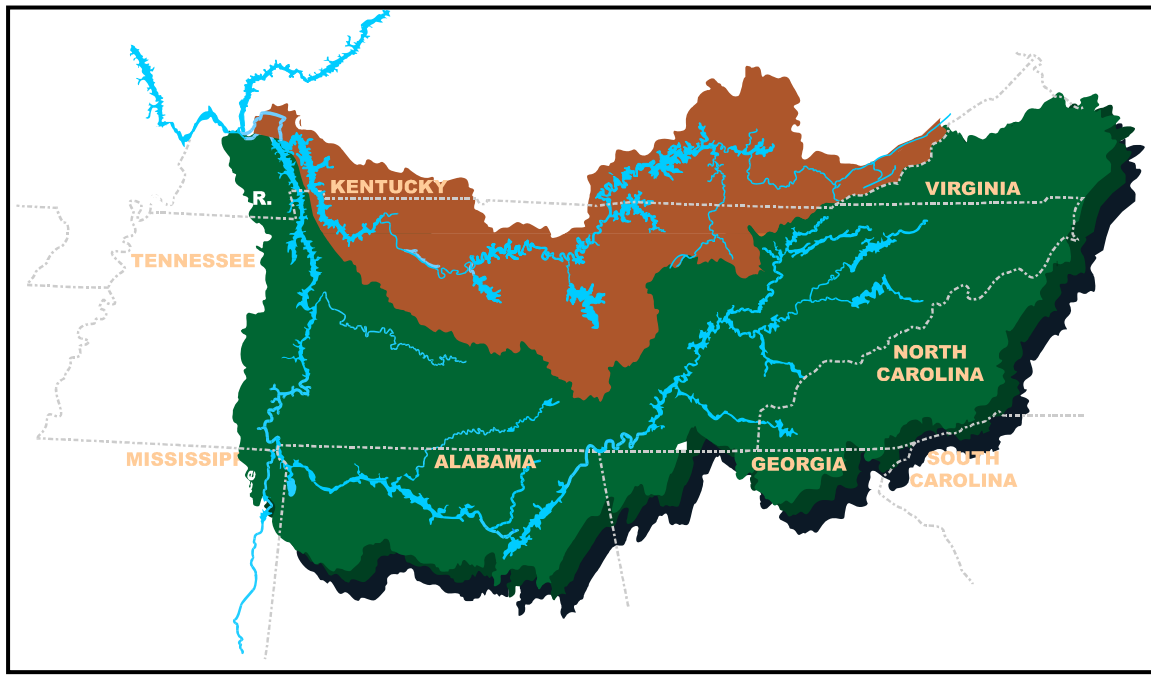
- the U.S. Environmental Protection Agency (EPA),
- the U.S. Geological Survey (USGS),
- the Tennessee Wildlife Resources Agency (TWRA),
- the Utility Management and Review Board (UMRB), and
- the Waste Water Finance Board (WWFR).

One means of providing wider areas within Tennessee with more reliable water supplies that has begun to be discussed more widely is the possibility of linking more communities to either the Tennessee or the Cumberland Rivers. Together, these two river basins cover more than 80% of the state's land area and all of the state's major urban areas with the exception of Memphis and Jackson, both of which are served by aquifers. These two rivers have more reliable water flows during both wet and dry periods than the state's smaller streams and may be able to accommodate the needs of larger areas of the state than they currently serve, especially those areas that rely on either surface water storage reservoirs or smaller ground water sources. The prospect of greatly expanding the distribution and use of the water from the Tennessee and Cumberland Rivers raises a number of inter-governmental issues and questions.

- **Tennessee River System**

TVA was chartered in 1933 by the federal government to manage the resources of the Tennessee River and its tributaries with an eye toward promoting economic development in the Tennessee River Valley. The agency fulfills this mission by working cooperatively with the USACE, which has responsibility for managing the navigable waters of the United States, a mission that dates back to the 1890s beginning with the Rivers and Harbors Act. Local water supply is only one of many uses for which TVA allocates water from Tennessee River. Others include navigation, flood control, power generation, economic development, and recreation.

Tennessee and Cumberland River Basins



Supplying drinking water is not the primary mission of TVA, nor is it its first priority. Allocating water for withdrawal by water utilities is in some respects a byproduct of TVA's dam and reservoir operations for navigation, flood control, power generation and economic development. By managing the river system for these purposes, TVA has created reserves of water that allow it to accommodate many uses beyond its original mandate. Water from the Tennessee River is also allocated to maintain navigation flows in the Tennessee-Tombigbee Waterway. And environment regulations influence how much water is released at various points on the river and when.

TVA also is not funded by federal grants, but rather is dependant on the revenues that it generates through its river operations. Its primary source revenue is power generation, and river flows throughout the system are carefully managed to ensure that water is available to cool both its nuclear and its conventionally fueled power plants and to the extent possible, to generate hydroelectric power. Diverting water from hydroelectric power generation, such as for recreation flows or domestic or industrial use, can adversely affect TVA's power generation budget. This became evident recently when TVA reported losses for the fourth quarter of 2007 because it was unable to generate sufficient hydroelectric power to meet its demand levels because of the pervasive drought conditions throughout 2007. TVA instead was forced to shift to more costly power generation modes, such as burning oil and natural gas, using nuclear power, or buying electricity from outside sources.

Water withdrawal requests from the Tennessee River system are reviewed and processed by TVA's Environmental Stewardship and Policy Organization, and are handled administratively. While TVA does assess a fee for processing the application, it only charges for water withdrawals when they result in an inter-basin transfer out of TVA's power generation system, that is, where the water withdrawal would create a

potential loss of revenue from power generation. As a practical matter, TVA looks at whether this transfer of water from the river system would be to an area in which TVA sells power via one of its distributors in determining whether to charge for the withdrawal. If the water is going to be used in an area to which TVA supplies electricity, it would not charge for the water itself, it would only charge to process the permit.

Permits for water withdrawals from the Tennessee River system are made through TVA via a joint TVA/USACE application. TVA reviews the application under Section 26a of the Tennessee Valley Authority Act, and the USACE reviews the application for any potential environmental effects under the provisions of Section 10 of the Rivers and Harbors Act and Section 404 of the Clean Water Act. TVA does not formally begin its review of any of these applications until the applicant has first received the necessary approvals from the appropriate state government agency (TDEC in Tennessee).

It should also be noted that TVA relies on information from TDEC that it receives every five years to measure the amount of water that is withdrawn for municipal purposes, and these water withdrawals are not formally measured or metered. Thus the amount of water that is currently being withdrawn from the system for water supply purposes can only be estimated rather than measured precisely.

- **Cumberland River System**

The USACE is responsible for managing the use of water in the Cumberland River system under Section 10 of the Rivers and Harbors Act and Section 404 of the Clean Water Act. Through its civil works program, the USACE carries out a wide array of projects that provide flood protection, hydroelectric power, management of navigation channels and ports, recreational opportunities, and water supply. As in the case of TVA's operations within the Tennessee River system, providing water for municipal water supply purposes is not the primary focus of the USACE's operations along the Cumberland River system. Rather, allowing water to be available for municipal uses has become possible as a byproduct of the dams, reservoirs, and locks that have been built to provide flood control and ensure sufficiently reliable water flows for navigation.

Application for withdrawing water from the Cumberland River system is made to the USACE through a joint application to both the Corps and TVA because the two entities work cooperatively in managing operations along the river system. The USACE also requires that an applicant obtain any necessary state permits prior granting its own permit. Unlike TVA, the USACE does not require state authorization before it begins reviewing the request. However, it withholds final approval evidence of any necessary state approvals is received.

Along the main stem of the river, the USACE neither charges for water storage nor guarantees the availability of water for withdrawal. Since one of the USACE's primary missions to maintain a navigation channel in the Cumberland with a minimum depth of 9 feet, there is a strong likelihood that any intake built below that level will remain covered. However, there is no guarantee of the flow of water along the stem of the river, and should circumstances arise where water flows had to be reduced because of

drought conditions or other contingencies, any utility withdrawing water from the main stem could face an interruption in water supply.

Unlike the TVA, the USACE charges for water storage in its reservoirs and in return commits to providing a specified minimum amount of water. The charge for water storage is determined by prorating the costs of building the projects (dams, etc.) among the beneficiaries of the water stored within the reservoir as authorized by the US Congress.

Along the Cumberland River, it should also be noted that there are some near term considerations that are affecting the amount of water currently being stored behind the Corp's reservoirs. A number of structural problems and leaks have been identified in the Wolf Creek Dam, which holds the waters in Lake Cumberland, Kentucky. This is the main source of stored water along the main stem of the Cumberland River. Even Nashville is dependent on it. The USACE has recently begun repairs, however the problems with the dam have caused them to lower lake elevation levels approximately 37 feet. The repairs will require several years, and the time frame for restoring the lake to its typical operational levels remains unclear. These lake levels would not affect any currently permitted water withdrawals; however, they may affect water levels down stream from the dam because less water can be stored in the reservoir during the rainy winter season to help ensure sufficient water during the drier summer season. There have also been leaks and structural problems at the Center Hill Dam, which impounds Center Hill Lake in Tennessee. Consequently, the USACE has modified its normal operations and pool levels there as well, and the lake may have to be lowered as much as eighteen feet below normal levels. Repair work on there may last into 2014.

State of Tennessee

Responsibility for overseeing the use and protection of water resources in Tennessee at the state level lies primarily with TDEC. TDEC administers a number of environmental programs to protect the quality of the state's natural resources and to safeguard human health. Responsibility for managing water resources within TDEC and reviewing applications for the use of water are spread primarily between the Division of Water Supply and the Division of Water Pollution.

Water Supply Division

Overseeing the quality of drinking water lies primarily with TDEC's Division of Water Supply. The division is responsible for implementing the provisions of the Tennessee Safe Drinking Water Act, which regulates the quality and quantity of drinking water in the state; the Safe Dams Act, which regulates the construction of non-federal dams; the Water Resources Act; and the Water Withdrawal Registration Act.

The division reviews and approves plans for the construction and operation of public water supplies including design, construction, and operation of public water systems. It also enforces regulations governing the location, design, construction, and continuous operation and maintenance of these facilities to ensure that the water meet minimum public health standards for potable use. Its review is focused on evaluating the quality

of the source for drinking water purposes and reviewing the construction plans for the water processing facilities necessary to produce potable water for distribution.

The water supply division also evaluates the quality of the water source from which the water is proposed to be withdrawn from. If there were concerns about the quality of the source water, they may require some type of additional water treatment measures prior to approving the construction plans to ensure the quality of the drinking water that would result from the proposed system. As such, the role of the water supply division is not to make allocation decisions concerning any new or existing water intakes. The role of the Water Supply division is not to evaluate the desirability or value of the water withdrawal from a water quantity perspective, or to decide which of any number of competing uses of water should be prioritized in any given manner. Their focus is on the quality of the water to be delivered for human consumption in order to maintain public health standards. Thus, the water supply division is not directly responsible for making allocation decisions on who gets water from where or in trying to balance the competing needs of multiple water users trying to withdraw or otherwise having water reserved for their own particular purposes.

Water Pollution Control Division

The Division of Water Pollution Control administers the Tennessee Water Quality Control Act of 1977. The division monitors, analyzes, and reports on the quality of Tennessee's water, and it reviews permits for discharges into streams according to state and federal regulations. The division also reviews wastewater construction plans and specifications for municipal and industrial facilities. Activities such as stream channel modification, wetland alteration, and gravel dredging are regulated by the division.

The division reviews withdrawal requests for possible effects on water quality. Their review takes the form of either an Aquatic Resource Alteration Permit (ARAP), a 401 water quality certification under the federal Clean Water Act, or a national pollutant discharge elimination system (NPDES) permit before the course of a stream can be altered by the diversion of water or the building of an intake structure. The applicable state permits must be issued before either TVA or the USACE will approve a water withdrawal request.

In their review, TDEC evaluates the in-stream effects of the proposed water withdrawal and looks primarily at water quality, whether the proposed withdrawal could result in unacceptable pollution levels or lower water quality. They also look at the overall effects on the stream and on existing water users. This tends to be of greater concern with smaller streams such as the Duck River, which has limited flows at times and many competing uses, as well as environmental concerns, and less so on larger rivers such as the Tennessee and the Cumberland.

Discussion

The future success and vitality of Tennessee's communities depends on safe and reliable sources of water for a healthy population, sustainable agriculture, and economic

growth. The recent drought has caused many to question their assumptions about the reliability of water supplies in many communities. Drought combined with the sustained growth pressures experienced by a number of counties in the state such as Williamson and Rutherford are creating increased demands on limited local water resources and raises concern about how to better plan for the tough water allocation decisions we will inevitably face.

Under the current decision-making system for water supply and water withdrawals, the state plays a somewhat indirect role in water allocation decisions, operating on a case by case basis. TDEC's Division of Water Supply does not directly regulate the amount of water that a utility might provide. Its review is limited to evaluating the quality of the water source for drinking purposes and reviewing the construction plans for the water processing facilities necessary to produce water for distribution. Review by the Division of Water Pollution Control of water withdrawal requests is limited to the effects of the specific withdrawal on the overall quality of the water in the stream.

Recent Legislative Efforts

Three different bills addressing some aspect of water policy in Tennessee were introduced in 2008 in the General Assembly. Efforts ultimately focused on the "Drinking Water Access and Resources Planning Act of 2008" (SB3044/HB2669). This bill called for the establishment of water management planning councils and would have created a drinking water access and resources fund. The major goals of this legislation were to promote water system planning among water utilities, regional cooperation and interconnections between water systems, and to improve drought preparation and planning across the state. The bill would have increased TDEC's role in reviewing water system plans. There was also a provision to establish a fund for helping rural communities provide municipal water to areas not currently served by water utilities. This bill, however, did not pass because of budget constraints and the costs associated with implementing the provisions of the bill.

Several steps should be considered for dealing with water issues in the future.

Greater state oversight of water permitting—state permitting systems for water utilities and other users are currently focused primarily on evaluating the quality of water sources, the systems used to process water for customer delivery, and periodic testing of processed water. Greater emphasis at the state level should be placed on working with local governments, water utilities and other users to evaluate the adequacy and reliability of water supplied to their customers and communities. This might include review and approval of water supply plans that local communities would rely upon.

Drought preparedness plans—water utilities should have plans for securing alternative water sources during water shortage emergencies, such as during extended droughts. The state's drought plan is more than 20 years old and was developed quickly as an "interim plan" and without broad based public input and discussion. This plan should be revised to reflect conditions in Tennessee today and the current understanding of water distribution and allocation models. It should include identifying water sources that are sufficiently large to be relied upon during drought. This would

entail putting a workable plan for connecting to these back up or secondary water sources in place in advance of any water emergency.

Planning for future water needs—local governments in cooperation with their water utilities should periodically assess the adequacy of their water supplies both to meet current demands and to meet the needs of future growth. Water supply assessment and planning should be integrated with the countywide growth plans developed under PC 1101 so that local government policies governing growth and development can be more closely integrated with development of local water supplies. This assessment should include reasonable estimates of the minimum amount of water necessary to meet current water needs during both typical weather seasons and drought conditions. Any plans for additional growth and development should be tied to the availability of identifiable water resources to support it.

Regional approaches to water supply—the state should consider developing a framework that either requires or encourages more regional approaches to water supply planning and delivery. This will be especially important if a greater number of communities and water users are to rely on the two big rivers, the Tennessee and the Cumberland River systems. Regional water supply planning might take a number of forms and could range from ensuring that water supply planning within each municipality or county is coordinated with all of the various water system operators in the area to developing regional approaches that span several counties. Ideally, any regional approach would be organized around the river basin concept would ensure that environmental concerns were adequately considered.

Many of these recommendations have been made in previous reports and attempts to establish a comprehensive water policy for the state. For example, in a 2002 Comptroller's report, *Toward A Long-Term Water Policy for Tennessee*, and more recently, by TDEC's creation of the Water Resources Technical Advisory Committee (TAC) to discuss possible changes in statewide water policy. This committee was authorized by the Tennessee Water Resources Information Act of 2002 to serve as an advisory group to the Commissioner of Environment and Conservation and to make recommendations on water resources issues. As of this writing, the TAC has begun to focus on revising the state's drought preparedness plans and on examining ways to encourage more regional approaches to water planning and distribution. These efforts should be supported with an eye toward making recommendations for legislative consideration in upcoming legislative sessions.